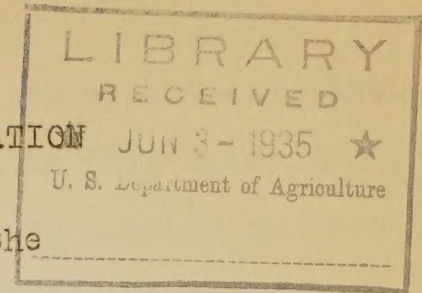


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ANIMAL HUSBANDRY DIVISION
HAWAII AGRICULTURAL EXPERIMENT STATION
HONOLULU, HAWAII



Under the joint supervision of the

UNIVERSITY OF HAWAII
and the
UNITED STATES DEPARTMENT OF AGRICULTURE

Progress Notes on Experiments and Other Items of Interest

No. 10

May, 1935

These progress notes on experimental work and other items of interest to livestock men in the Territory are issued from time to time by the Animal Husbandry Division. You are invited to suggest other lines of research that you deem important and to submit inquiries to the University.

FATTENING BEEF STEERS ON FEEDS
PRODUCED IN HAWAII

by L. A. Henke,¹
Animal Husbandman, Hawaii Agricultural Experiment Station.

Purpose

The purpose of this 126 day experiment was to determine the value of a Maui produced feed mixture consisting of pigeon pea plant meal, corn-cob and husk meal and cane molasses for producing economical gains in steers.

Plan

This was a cooperative experiment between the Maui Agricultural Company, Ltd. of Paia, Maui, and the Hawaii Agricultural Experiment Station. The Maui Agricultural Company, Ltd., supplied

¹ This problem was first presented to F. G. Krauss, Director of the Agricultural Extension Service and we are indebted to him for valuable suggestions which lead to this experiment.

The valuable help of G. W. H. Goo, Assistant in Animal Husbandry in computing the data of this experiment is also acknowledged.

three, 22 month old Aberdeen-Angus steers of good type, and also produced and prepared the feed mixture which was fed in this experiment. The steers and a shipment of the feed mixture, known locally as Feed No. 3, arrived at the Hawaii Experiment Station on November 16, 1934, and after five days of rest and getting adjusted to their new surroundings, the steers were started on the test on November 21 and feeding of this mixture continued till the steers were marketed on March 27, 1935.

The Feed Mixture

The composition of the feeds and proportions in which they were combined follows:

	Digestible		Nutritive Ratio
	Crude Protein	Total Nutrients	
	%	%	
Pigeon pea hay meal ¹	11.7 ³	53.6 ³	1:3.6
Corn-cob-husk meal ²	5.5	66.7	1:11.1
Cane molasses	1.0	59.5	1:58.5
<hr/>			
Maui Agricultural Company Ration #3	lbs.	lbs.	
100 lbs. pigeon pea hay meal	11.7	53.6	
100 " corn-cob-husk meal	5.5	66.7	
<u>75</u> " cane molasses	<u>.75</u>	<u>44.6</u>	
275 " mixture	17.95	164.9	
100 " mixture	6.5	60.0	1:8.2

This mixture contained 27.2 percent cane molasses, but the molasses was so well absorbed by the other ingredients that it was not appreciably sticky and made an attractive meal.

1. Entire plant cut to within three inches of ground, dried and milled; plants were medium podded.
2. Entire ear including cob and husks.
3. Krauss, F. G. The Pigeon Pea, its improvement, culture and utilization in Hawaii. Hawaii Agr. Exp. Sta. Bul. 64 (1932) p. 36. (total nutrients assumed to be 75% digestible).

Manner of Conducting Experiment

The steers were weighed once each week during the progress of the experiment and the initial and final weights are the average of three weights on three consecutive days. They were given as much of the No. 3 mixture as they would eat and feed remaining at the end of a 24 hour period was weighed back. This was true of roughages as well as the concentrate ration although an attempt was made not to feed them more than previous experiences indicated they would likely eat, and the quantity of roughage fed was purposely kept quite low in order to encourage them to eat as much as possible of the experimental ration.

Records of individual feed consumption are not available. The steers were fed their concentrate ration in a common trough and roughages were similarly fed in a common feed rack.

The steers were kept in a small pasture 36 x 200 feet in area provided with shade and ample water. They were in good health throughout the experiment.

Rate of Gains and Feed Consumption

While the feeding of the concentrate mixture described above was continuous, the 126 day feeding period is divided into three parts in the computations which follow.

First Period - 61 days. Along with the steers and the No. 3 feed mixture was shipped a quantity of alfalfa hay for roughage. This was fed at the rate of three pounds per steer per day until the supply was exhausted. While the steers relished same it seemed to be a rather expensive roughage so it was decided to use a limited quantity of locally produced green Napier grass for roughage for

Summary of Concentrate Experiment

The steers were weighed once each week during the progress of the experiment and the initial and final weights are the average of three weights on three consecutive days. They were given as much of the No. 3 mixture as they would eat and food remaining at the end of a 24 hour period was weighed back. This was true of roughage as well as the concentrate ration although an attempt was made not to feed them more than previous experiments indicated they would likely eat, and the quantity of roughage fed was purposely kept quite low in order to encourage them to eat as much as possible of the experimental ration.

Records of individual feed consumption are not available. The steers were fed their concentrate ration in a common trough and roughage was similarly fed in a common feed rack. The steers were kept in a small pasture 50 x 200 feet in area provided with shade and ample water. They were in good health throughout the experiment.

Rate of Gain and Feed Consumption

While the feeding of the concentrate mixture described above was continuous, the 126 day feeding period is divided into three parts in the computations which follow.

First Period - 61 days. Along with the steers and the No. 3

feed mixture was shipped a quantity of alfalfa hay for roughage. This was fed at the rate of three pounds per steer per day until the supply was exhausted. While the steers yielded some it seemed to be a rather expensive roughage so it was decided to use a limited quantity of locally produced green alfalfa grass for roughage for

the rest of the experiment.

Second Period - 40 days. The steers as in the first period were supplied with all the No. 3 mixture they would eat and about 10 pounds of green Napier grass per steer per day.

Third Period - 25 days. The supply of corn-cob and husk meal became exhausted so barley was substituted in its place during the last 25 days of this feeding trial. Green Napier grass was fed in the same quantities as in the second period.

the rest of the experiment.

Second Period - 40 days. The steers as in the first period

were supplied with all the No. 5 mixture they would eat and about

10 pounds of green Egyptian grass per steer per day.

Third Period - 25 days. The supply of corn-cob and hark meal

became exhausted so barley was substituted in its place during the

last 25 days of this feeding trial. Green Egyptian grass was fed in

the same quantities as in the second period.

GAINS AND FEED CONSUMPTION

	" First " Period	" Second " Period	" Third " Period	" Entire " Period
Experiment Started	" 11/21/34	" 1/21/35	" 3/2/35	" 11/21/34
Experiment Ended	" 1/20/35	" 3/1/35	" 3/26/35	" 3/26/35
Number of days	" 61	" 40	" 25	" 126
Average final weight in pounds	" 943.3	" 1036.7	" 1080.0	" 1080.0
" initial " " "	" 770.0	" 943.3	" 1036.7	" 770.0
" gain in pounds	" 173.3	" 93.4	" 43.3	" 310.0
" daily gain per steer in lbs.	" 2.84	" 2.33	" 1.73	" 2.46
" pounds concentrates consumed daily per steer	" 20.4	" 29.5	" 30.3*	" 25.2
Pounds concentrates consumed per pound of gain	" 7.18	" 12.66	" 17.51	" 10.24
Average pounds of alfalfa hay consumed daily per steer	" 3.0	" --	" --	" --
Pounds alfalfa hay consumed per pound of gain	" 1.06	" --	" --	" --
Average pounds of green Napier grass consumed daily per steer	" --	" 11.7	" 10.7	" --
Pounds of green Napier grass consumed per pound of gain	" --	" 5.02	" 6.18	" --
Cost of roughage per pound of gain ^o	" \$.016	" \$.013	" \$.015	" \$.015
Value of ton of concentrate mixture in this experiment ^o	" \$ 20.60	" \$ 12.16	" \$ 8.56	" \$ 14.64

* Barley was substituted for corn-cob-husk meal in the last period.

^o Assuming alfalfa hay at \$30.00 and green Napier grass at \$5.00 per ton.

o Assuming a pound of gain (live weight basis) to be worth nine cents.

It is obvious from a study of the preceding table that the rate of gains decreased as the experiment progressed and this in spite of the fact that feed consumption increased. As the steer becomes older the natural growth rate decreases until in the later stages of the fattening period the gains are largely due to fat deposits and these are costly in food nutrients and an animal put in the best possible condition by long feeding is rarely as profitable as if marketed earlier. A certain amount of finish is desirable to bring about marbling in the meat (deposits of fat between muscle layers) because such deposits cause the meat to be better flavored and more tender.

While in this experiment the roughage fed the first period was alfalfa hay instead of Napier grass as in the last two periods, it is not believed that this was the major cause of the better gains in the first period. The roughage fed the last two periods was the same and still the declining rate of gains continued, the second period giving materially better returns on the feed than the third period, thus confirming the view that gains become more costly in feed required as the fattening period is prolonged.

But it is not entirely correct to conclude from this that the steers should have been marketed at the end of the first 61 day period. While this period gave by far the best returns on the feed, the steers were probably not fat enough at the end of this time to bring the higher price which well fattened beef commands.

It is not believed that the substitution of barley for corn-cob-husk meal during the last 25 days of this experiment materially affected the results.

One purpose of this experiment was to determine the value of the concentrate ration used based on the value of the beef produced by same. In this calculation shown in the last line of the preceding table it was assumed that a pound of increased weight was worth nine cents since two of the dressed carcasses were sold at 18 and the third at 16 cents per pound and the dressing percentages were well over 50 percent. After deducting the assumed value of the roughages used, \$.016 per pound of gain in the first period from nine cents and dividing this by the pounds of the concentrate mixture required to make a pound of gain, we find that on the basis of the beef produced one pound of the concentrate mixture was worth 1.03 cents or the ton value was \$20.60. This value was only \$12.16 and \$8.56 for the second and third periods respectively or an average of \$14.64 for the entire period.

Individual Gains and Grade of Resulting Carcasses

The record of gains made by the individual steers, and weight and condition of resulting carcasses follows:

Steer No.	Initial weight lbs.	Final Weight lbs.	Average daily gain lbs.	Carcass Weight lbs.	Dressing Percentage	Federal grade of carcass	Price paid per pound of carcass cents
1	730	1070	2.70	582	54.4	medium	18
2	850	1180	2.62	645	54.7	<u>good</u> low to medium	18
3	730	990	2.06	579	58.5	<u>choice</u> medium	16*
						<u>good</u>	

* Back bruise and not as good quality as the other two for which the top price was paid.

Summary

1. Three, 22 month old, Aberdeen-Angus steers were fed for 126 days on a Maui produced concentrate ration consisting of 27 percent cane molasses and $36\frac{1}{2}$ percent each of pigeon pea hay meal and corn-cob and husk meal.

2. On this ration with a small quantity of roughages the steers made an average daily gain of 2.46 pounds, consumed 10.24 pounds of the concentrate mixture per pound of gain, and in terms of the value of the beef produced the concentrate mixture was worth \$14.64 per ton.

3. Rate of gains declined and feed costs of a pound of gain increased materially as the experiment progressed. On the basis of gains made during the first 61 days, gains averaged 2.84 pounds daily, only 7.18 pounds concentrates were required per pound of gain and the mixture was worth \$20.60 per ton.

4. All the carcasses graded good or better and dressing percentages averaged 55.8 percent.

